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CONTRE-COUP.

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A CASE OF SUCCESSFUL TREPHINING FOR
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Hospital.*

J. M., a waiter, born in England, twenty-eight years of age, married, was admitted to the Massachusetts General Hospital, May 13, 1890, in the service of Dr. Homans.

He was brought in unconscious, and was said to have been thrown from a horse just outside the hospital, and was supposed to have struck his head upon the cobble-stones. His temperature was 98.2°, and his pulse was 60. There was a hæmatoma, with abrasion of the scalp, at a point corresponding to about the middle of the suture between the right parietal and occipital bones. The right pupil was dilated when the patient was brought in. When seen by Dr. George Eliot, within two minutes after entrance, consciousness was returning, the pupils were equal, and reacted normally. There was no bleeding from the nose or ears; the pulse was slow and full. The hæmatoma was laid open under cocaine anæsthesia, and the finger was introduced. No fracture was made out, although through the swelling there appeared to be a depressed fracture. One stitch was taken. Apparently perfect consciousness returned. There was no paralysis.

May 15th (third day). The patient was quiet, sleeping most of the time until evening, when he became

¹ Read before the Surgical Section of the Suffolk District Medical Society, December 3, 1890.

delirious, and got out of bed several times. He was easily quieted. The temperature was 103° . The bowels were moved by calomel.

May 16th (fourth day). The patient is almost comatose. Aphasia has appeared.

May 21st (ninth day). The temperature has gradually come down to normal. The pulse is a little faster, though still slow and full. The general condition has remained about the same as at the last entry. Nourishment is well taken. The patient is not violent, but leaves his room from time to time. He answers "Yes" to almost every question. When asked if he wants anything says, "I want" — but cannot find the word. He apparently understands what is said to him, and is, perhaps, a little brighter this morning. Early in the morning the night nurse chanced to see spasmodic twitching of the muscles of the right side of the face, and especially noticed that the right corner of the mouth was drawn down. The pupils were unaffected. The spasm was limited to this locality, and the convulsion lasted perhaps one minute. Slight twitching of the muscles of the chin on the right side recurred during the day at intervals of several hours. At 10 P. M. convulsive movements appeared in the muscles of the left side of the face. These spasms were similar to those already noted, excepting that the right eyelid was closed, while the left side of the face was twitching. He seemed conscious, though unable to talk. Dr. J. W. Elliot, who was temporarily acting for Dr. Homans, had the patient removed from the general ward, apprehending further cerebral developments.

May 22d (tenth day). At 3.30 A. M., the right side of the face was convulsed as at first. Slight twitchings and similar convulsive movements ensued at intervals of two and three hours during the day, increas-

ing in frequency towards night. The facial muscles and the platysma myoides alone were affected.

May 23d (eleventh day). The convulsions recurred at intervals of ten to fifteen minutes. Dr. Walton was asked to see the case at 10 A. M. At this time convulsions were recurring every fifteen minutes, commencing at the right angle of the mouth and spreading to all the muscles of the face, involving very slightly the occipito-frontalis, and in a marked degree the platysma. The convulsions lasted about one minute, the face remaining drawn to the right for a short time. There was paresis of the right side of the face between the convulsions; no paralysis elsewhere. The patient was unable to protrude the tongue, which appeared to deviate to the right. Some of the convulsions ended suddenly, others gradually; in the latter the angle of the mouth remained convulsed until the last. The patient was apparently conscious of his surroundings to a certain degree, and on being questioned made attempts to reply. The attempts were ineffectual, partly, apparently, on account of aphasia, and partly on account of lingual paralysis. The pupils were alike, and reacted normally. There was no rolling of the head nor eyes. As a result of this consultation with Dr. Walton, immediate operation was decided upon, the convulsions locating the trouble (probably hæmorrhage) at the lower end of the fissure of Rolando, on the left, the side opposite the injury. At 3.30 P. M. the convulsions recurred every three or four minutes, each lasting about two minutes. At this time the convulsion, which began as before, at the right angle of the mouth and in the platysma, spread rapidly to all the muscles of the face, and in several instances to the right arm and leg, then to the other side of the body, and became general. The spasms were generally clonic in character, but in one convul-

sion the entire body was in a state of tonic rigidity. In the convulsions limited to the face, consciousness was not lost and natural movements were made with both arms, the patient at times crying out and sobbing, with copious tears and salivation, but not frothing at the mouth. The tongue shared in the convulsions, being drawn to the right with clonic spasms, striking against the teeth violently, accompanied by a clucking noise. At 4 P. M., the head and eyes rolled to the right for the first time. The head was shaved and prepared for operation, the fissure of Rolando being carefully marked out with an aniline pencil; the scalp being scrubbed and poulticed with corrosive sublimate, 1 to 2,000. He was now seen by Dr. Putnam, who concurred in the desirability of an operation, as had also Dr. Carter, who saw him earlier. By this time the entire body was in a state of almost continuous tonic rigidity.

OPERATION (BY DR. HOMANS).

The patient having been etherized, a large semicircular incision was made about three inches in diameter with the convexity upwards; the fissure of Rolando running across it at right angles to the line between its two extremities. The incision was made down to the bone, the periosteum elevated and the flap retracted. The point of selection was just anterior to the lower end of the fissure of Rolando, where a large button was removed by a trephine one and one-half inches in diameter. Nothing abnormal was found about the bone. The dura mater was bulging and tense, somewhat yellowish and opaque, non-pulsating and very prominent. Incision through it revealed a dark clot. The opening was enlarged, and the clot partially removed. It was found to extend in every direction under the dura mater. The brain

itself was prominent and bulging where the dura mater had been opened, but on removal of the clot the prominence subsided, and pulsation gradually appeared. The trephine opening was enlarged anteriorly and posteriorly with rongeur forceps, and the entire clot turned out. The pia mater was cloudy and discolored, and in one spot (about the size of a five-cent piece) black. This point was apparently just behind the fissure of Rolando in the region of the platysma centre (Fig. 1). Incision through the pia mater at this point revealed a small clot, which was turned out.

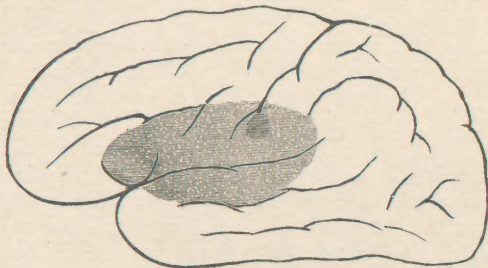


FIG. 1. The lighter shading represents approximately the seat of the larger (subdural) hæmorrhage; the dark round spot, the underlying (subpial) hæmorrhage revealed on turning out the former.

When the trephine opening was enlarged downwards and backwards, a larger amount of clot was removed together with bits of brain substance, in the more dependent part. The brain was lacerated to a considerable extent. The clot was soft, non-friable and black. No bleeding point was found. The blood and clot were washed out with warm water. A quill drainage-tube was introduced where the brain was lacerated, and was brought out at the edge of the wound just above and behind the insertion of the auricle. Another quill was placed across the upper segment of

the wound, and the flap was replaced and sutured with continuous catgut. A few branches of the temporal artery were tied. Dry dressing was applied and a skull cap. The operation lasted an hour and twenty minutes. The condition after operation was excellent, and after recovery from the ether, the patient was apparently conscious, though unable to speak. There were no convulsions.

SUBSEQUENT HISTORY (BY DR. WALTON).

May 24th (day following operation). There have been three slight convulsions during the night, confined to the corner of the mouth. He is apparently conscious, and appears to understand simple sentences at times, although occasionally misinterpreting. For example: when asked to raise his hand, he raises his head; and when asked to put out his tongue, he raises his hand. (Sensory aphasia, word deafness.) His hearing is apparently perfect. Motor aphasia is marked, almost preventing utterance. For example: "Have you headache?" Answer: "I—I—it is" — During the following night there was a slight convulsion of the right corner of the mouth.

May 26th. Improving. At times he raises his hand, and makes other motions correctly when asked; at other times he misinterprets the request. He is unable apparently to protrude the tongue. Careful examination being made for loss of sensation, including that of the face, gives a negative result. The patient is brighter; makes unsuccessful attempts at conversation, and makes his wants known regarding the bedpan, etc., by gestures.

May 27th. He generally understands what he is asked to do, although attempts at conversation are still ineffectual. When asked what he complains of, he answers, "I have a—what do you call it?—What is it?—Why a"—(points to head).

May 29th. He puts out his tongue for the first time, and does it readily. There is marked deviation to the *left*. When asked how he felt, he said, "What is the matter with me now is a little-little" — "Headache?" — "Yes, headache."

May 31st. The tongue is protruded fairly straight. The examination for facial paralysis is unsatisfactory. When asked to shut his eyes, he winks. When asked to shut his eyes and hold them shut, he shuts his mouth tightly; on the request being repeated, he nods his head. When asked to open his eyes wide, opens his mouth wide; on the request being repeated, he protrudes his tongue. Being asked if he felt a touch on the right cheek, he did not understand the question, but kept saying that the other side was sore. His motions, however, showed that there was no loss of sensation. Attempts at conversation resulted in many inarticulate noises and repetitions of the word *yes*, interspersed with occasional correct sentences.

June 6th. Motor as well as sensory aphasia improving, and the patient is becoming quite talkative. For example: "How is your head?" — "Yes, it is a kind of a — a little something gone — a kind of a gait — yes." — "Let me hear you say headache." — "Gearish, isn't it? G-e-r-n, isn't it? — G-l-e-a-u, isn't it?" When asked to put out his tongue, he spells "W-e-a-l-t-h," but shuts and opens his eyes when asked, and raises each hand correctly. When shown a fan and asked, "What is that?" answers, "That is a — what do you call it? a geremea." — "Is it a fan?" — "Yes, I was trying to say a fan — I believe I have raised that seventy-four — I believe I have got it right." — "Can you laugh?" — "Pretty good now," (opening his mouth).

Examination now reveals a paresis of the muscles supplied by the lower branches of the right facial

nerve. The lightest touch is localized accurately by him on the right side of the face, however, as on the left with the eyes shut. Also on the right hand and other parts of the body. The grasp of the right hand is somewhat weaker than the left, although both are good. He states, "I think my right hand is bigger." "Do you mean weaker?" Answers, "Yes." Combined and separate movements of the hand, arm and wrist are apparently normal. He is unable to read when given a book, although his sight is perfect, and he was able to read before the accident. He recognized ordinary objects and their uses, showing that there was no "mind blindness" excepting for words. (Word blindness.) When asked to write his name he spelled, "M-o-r-d" to himself, and then wrote, forming the letters perfectly,

Lordard

Attempting to read what he had written, he read, "F-o-r-d." When asked if that was his name said, "M-a-r-g-h — ain't it?" When asked to write *fan*, wrote,

Bustrance

then read what he had written, "F-a-s-m-a-w-e." When asked again what he had written, said, "It is supposed to be w-duft-nenft-m-u-st-mance." When asked if he felt a touch, he made various irrelevant answers, but appreciated perfectly the fact that he was expected when touched to put his finger on the same spot with his eyes closed, which he did perfectly and without hesitation.

June 10th. Examined in the presence of the Mas-

sachusetts Medical Society. Being asked to write his name wrote "Calais," and when asked to read it, read "V-a-v-a-v-a." When requested to open his eyes, etc., at first he responded incorrectly, afterwards correctly. His intelligence at this time seemed excellent.

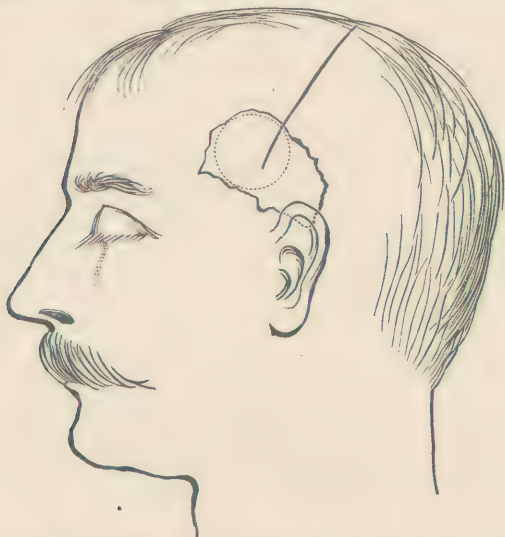


FIG. 2. The irregular line represents the opening in the skull left by the rongeur forceps, the dotted line showing the trephine opening. The line of the fissure of Rolando is shown.

June 21st (a month after operation). Talks freely and volubly on all subjects, only occasionally misplacing a word. He gives a complete account of a former attack of indigestion, only using the word "accused" instead of "relieved." ("That medicine *accused* me greatly.") He says, "I am sorry to see you," then

corrects himself and says, "I am glad to see you." Again: "I am glad Dr. Elliot has a sore hand. I mean I am sorry," etc.

July 14th. Writes nearly, and reads quite, correctly, reading a long sentence from the Dispensatory, only stumbling at the word "Pharmacopœia" which he reads correctly the second time. In conversation he only forgets an occasional word. The shape and seat of the skull opening, as made out by feeling the edges through the scalp, is shown in Fig. 2.

After having been discharged, with orders to report occasionally, the patient presented himself July 16th, and was admitted to the service of Dr. Cabot, from whose records the following notes are taken. There was a large swelling above the left ear, extending over the temple. There was a small opening discharging a little pus. There was no tenderness and no pain, except a slight frontal headache, principally on the left. The patient was weak and somewhat rambling in his talk. The temperature was 101.5° , the pulse 84. A phenyle poultice was applied over the swollen area. A letter written to the *Globe* at this time (but not forwarded) is appended.

MASSACHUSETTS GENERAL HOSPITAL, }
July 17, 1890. }

EDITOR GLOBE NEWSPAPER: Sir in hearing from several people that they read of my accident in front of the Massachusetts Hospital from the *Globe* I beleive in writeing to the *Globe* for thanks for allowing freinds to hear quickly what hurt I got but more so, for the Hospital and the Doctors, that wonderfully saved my life, from what I heard while I was getting wonderfully well, I heard the whole affair of me, and having heard in time, some various things that have been done by accident, and some wonderfully actions by Doctors I knew that the affect I got from the horse was wonderful by the Doctors to keep me from

dying I know that when the brain has to be taken and cleaned and the patient quickly gets good and strong and get home is a very wonderfully affect of the doctor and to show that Doctors will try to do all their labor to give the people can be seen every day. Therefore if we the people that get afflicted ought to thanks that we are not in the Interior of Africa but in a civil city where occasionally we come across Men who will do all their best to affect us. J. M.

July 17th. The swelling has lessened. There is still some headache. There is a slight free discharge. (Urine: color normal, reaction acid, specific gravity 1016, no albumen, sed. urates.)

July 18th. There is scarcely any headache, the discharge is lessened, the swelling is slight. An ice-bag was applied to the head all day.

July 19th. The patient is doing well. Dry dressing applied.

July 21st. Some pain is complained of, localized over the frontal region on both sides. Phenyle poultice and ice-bag to the head.

July 24th. Patient is doing well, occasionally complaining of pain in the head.

July 27th. There is little pain, scarcely any discharge, no swelling or tenderness.

July 28th. There is no pain. The patient feels very well.

July 30th. Last night the patient began to vomit at eleven o'clock. He complained of pain in the mid-frontal region, extending back to the vertex. He slept very little during the night. This morning he has vomited once. The temperature is 101° . The pain has lessened somewhat. He has been rather drowsy nearly all day. The temperature in the afternoon rose to 102° , the pain still continuing, unrelieved by ice-bag or phenacetine.

July 31st. Patient feels better. He slept fairly

last night. The pain has lessened. The ice-bag is still applied. The bowels were moved copiously by ten grains of calomel. He feels rather weak. The pulse is fair, the temperature lower. There is no swelling nor tenderness on the left side of the head. The discharge is very slight. Urine: color normal, reaction acid, specific gravity 1026, sediment slight.

August 1st. There is considerable pain in the head, somewhat relieved by the ice-bag.

August 2d. The pain in the head is less. He complains of a "silly" feeling. Feels rather weak, and is unable to sit up long.

August 3d. There is scarcely any pain in the head. He feels much better, and has sat up nearly all day.

August 4th. There is less pain. The patient is quite comfortable, and about the ward. Vomited last night.

August 5th. Very little pain; no discharge. Ice-bag still used.

August 6th. Is feeling very well. Eats better.

August 7th. Very slight pain in both temporal regions. General condition good.

August 8th. Patient is feeling very well. There is no discharge. Poultice omitted. Very slight pain in occipito-frontal regions.

August 9th. Scarcely any pain in vertex; slight pain in infra-orbital regions, especially in the left.

August 11th. Slight pain as in last entry.

August 15th. Very little pain since last note. General condition good. Patient discharged.

Since his last discharge from the Hospital there has been no recurrence of trouble, and after a month the patient was perfectly well and working regularly as a waiter.

As an important factor in the favorable progress of this case, the writers would here express their appre-

ciation of the labor and untiring devotion of Dr. George Eliot, the house-officer in charge.

The test of practical experience has now been applied to nearly every form of operative measure upon the cranial contents which neurology has been able to suggest, or surgery to execute. Among the most favorable cases, both as regards accuracy of localization and success in removal, must be accounted those of cortical hæmorrhage.

Important advance has been made, it is true, in the treatment of intra-cranial tumors and in other directions, through the perfection of cerebral localization and the progress of cerebral surgery. The dangers and difficulties, however, inherent in this branch of the subject, of necessity reduce successful cases to a comparative minimum. We must at once eliminate deep-seated, multiple, and infiltrating tumors, as well as those of considerable size; those capable of absorption by internal remedies (gummata), and those accompanied by similar disease in other parts of the body (certain sarcomata, carcinomata, and tubercular growths), leaving a residue for which ten per cent. (the estimate of operable cases made by W. Hale White² on an analysis of one hundred cases of cerebral tumor verified by autopsy) is probably a liberal allowance. Deducting from this percentage those of mal-success due to the operation itself, and those in which the symptoms are not sufficiently marked for accurate diagnosis at a period when operation would be of avail, and the number remaining, offer a field which, though brilliant, and well worthy of the widespread enthusiasm the subject has aroused, is not so extended a one as might be wished.³

² Guy's Hospital Reports, 1885-6, 28, p. 115.

³ The same views are held by Osler (*Canadian Practitioner*, May 1, 1889), who also quotes Starr's analysis of 300 cases, only 19 of which would have warranted surgical interference, and in only 16 of which an operation might have been successfully performed.

Whatever grounds cause the neurologist to hesitate, and the surgeon to stay his hand where new growth is under consideration, the question of surgical interference for removal of superficial hæmorrhage is far simpler, and the demand, as a rule, more urgent. Familiarity with the symptoms of this lesion is therefore of prime importance, as well as that with the indications for operation.

Regarding the latter Nancrede⁴ says: "When hemiplegia occurs after a blow upon the head, or hemiplegia with hemi-spasm, however slight be the injury—provided that it is in the tempero-parietal region, even although it be not directly over the motor area—the surgeon is justified in exploring that area.

"In the coma resulting from intra-cranial hæmorrhage—from the middle meningeal artery for instance, as already pointed out—cerebral localization should guide the surgeon's hand, unless in those instances when the effusion is so large as to present no limited compression symptoms. . . .

"In those cases where the paralysis is on the side of the injury, that is, the result of hæmorrhage or fracture by counter-stroke, provided that laceration of the brain seems improbable, an operation over the motor-area of the side opposite to that of injury would seem indicated. This must be a rare condition, and is too often complicated with cerebral laceration at or near the site of the external injury itself."

It is with one of these comparatively rare⁵ cases that we have to do in this report, which amply illustrates both in the paralyses, the spasms, and in the

⁴ International Encyclopedia of Surgery. Ashhurst. Vol. v, p. 91.

⁵ These cases are not so rare but that certain typical ones have been reported, for example, a case by Gross (System of Surgery), verified by post-mortem; also a case by Watson, with recovery due to operation. (Lancet, 1856, 11, p. 249.) In a third case the operation was performed on the side of the injury and the patient lost, the hæmorrhage being on the opposite side.

subsequent symptoms, the importance of cerebral localization, and the confidence with which we may rely upon its teachings. The case also shows the tolerance of laceration on the part of the brain, even in a part important to its functions, and thus tends to do away with the contra-indication above enunciated. Whether laceration was present under the point of external injury also, we have no means of ascertaining; there could hardly fail to have been a certain degree. No symptoms, however, arose or have arisen pointing in that direction, unless possibly the slight convulsion on the left side, while the recovery has been perfect, notwithstanding a very considerable laceration at the dependent part of the seat of hæmorrhage, that is, as nearly as could be made out, of the first temporal lobe and the supra-marginal convolution.

With regard to the diagnosis of hæmorrhage at the surface of the brain, the symptoms, in case of extensive lesion, are similar, whether the rupture be of the middle meningeal artery (producing hæmorrhage between the dura mater and bone), or of the underlying vessels of the pia mater (producing hæmorrhage into the arachnoid cavity). It will, therefore, not be out of place to enumerate the symptoms of hæmorrhage from the middle meningeal artery in the order considered, to be that of their comparative value by Jacobson, in his exhaustive treatise on this subject in the Guy's Hospital Reports.⁶

(1) A period of consciousness intervening between the accident and the symptoms of compression. This period may vary, according to Wiesman,⁷ from fifteen minutes to eleven days. It may be absent, as Jacobson states, on account of (*a*) the severity of the original violence, (*b*) depression of bone, (*c*) accompanying injury to the brain, (*d*) the extravasation having been

⁶ Guy's Hospital Reports, 3d series, 1885-6, p. 256.

⁷ Deutsch. Zeitsch. f. Chir., Bd. 4, Heft 1 and 3; Annals of Surgery, December, 1885, p. 502.

immediate and copious owing to the size of the branch where ruptured, and (e) drunkenness.

(2) Hemiplegia, paraplegia, rigidity. The hemiplegia is not always present or always complete; where partial, the arm is likely to be affected without the leg, or with only a paresis of the leg, but the leg is probably never paralyzed without the arm. Paraplegia may occur in the case of extension from one hemisphere to the other. The paralysis may, in exceptional cases, be temporary.

(3) Dilatation (usually unequal) of pupils, the pupil being generally larger on the side of the hæmorrhage, on account of extension forward upon the sphenoidal fissure, causing paralysis of the third nerve. (Hutchinson.⁸)

(4) A slow, full, and laboring pulse.

(5) Unconsciousness, passing into coma.

(6) Stertorous, laborious or "snorting" respiration, or the breath emitted from the corner of the mouth like a whiff or puff of smoke. (Guthrie.⁹)

(7) Ecchymosis or contusions of the parietal and temporal regions, giving rise to a puffy or pulpy feel, and bloodlessness of the bones overlying the clot, probably due to interference with the blood supply on account of separation of the dura mater. (Abernethy.)

Wiesman¹⁰ adds, vomiting, unilateral impairment of sensation, aphasia, disorders of the bladder and rectum, automatic movements and lying always on one side, and rise in temperature. He adds also that convulsions may precede the affection.

The diagnosis between hæmorrhage above and that below the dura mater is so difficult, that little time need be spent in the effort, especially since the treatment is

⁸ On compression of the brain, London Hospital Reports, vol. iv, 1867, p. 29.

⁹ Injuries of the head, affecting the brain, p. 42.

¹⁰ Deutsch. Zeitsch. f. Chir., Bd. 4, Heft 1 and 3.

the same, and operation is called for with equal urgency in both. Jacobson has alluded to the following points in diagnosing laceration of the brain, though stating that there are none of certain reliability. (1) In middle meningeal hæmorrhage any scalp wound or bruise is usually over the area of the artery. (2) The interval of lucidity is likely to be absent or little marked in laceration of the brain. (3) Convulsive twitchings militate against middle meningeal hæmorrhage, and point more often to laceration of the brain.

In the case here reported, there was no hemiplegia, but the localized convulsions of true Jacksonian type, commencing without unconsciousness at the corner of the mouth then gradually extending to the extremities and becoming general, pointed so accurately to localized cortical irritation, as to furnish a much more urgent symptom than even hemiplegia. It seems probable that the small subpial clot underlying the larger one, furnished the irritation for the convulsions, especially since its seat, as nearly as could be determined, was over the platysma centre. The laceration of the brain may have contributed to this symptom, although it was rather far from the motor region implicated. The general symptoms of compression were, however, due to the larger hæmorrhage. The most interesting symptom as regards localization, was the aphasia, which was studied carefully during convalescence, and is reported in detail. The motor aphasia was typical and of the ordinary form. The sensory aphasia (word deafness) was extremely persistent, due probably to destruction of brain tissue in the posterior portion of first temporal lobe. Word blindness appeared to be also present, a symptom which would point to extension backwards towards the angular gyrus. These defects would probably explain the diffi-

culty in writing, without assuming lesion of the centre for writing.¹¹

The turning of the head and eyes to the opposite side, which appeared shortly before the operation, pointed to extension forwards and upwards towards the centre assigned to this movement by Ferrier, at the posterior end of the second frontal convolution. Certain, though not yet abundant, cases seem to show that this centre corresponds in man to that in monkeys, for example, a case, reported by one of the writers,¹² of sub-cortical glioma passing (as shown by autopsy) through the motor area and extending forward to a point at the posterior end of the second frontal convolution. The principal symptoms were convulsive movements of the face without unconsciousness, accompanied by paresis, and ushered in by marked rotation of the head and eyes to the side opposite the lesion. The same symptom was marked as regards the head, in the case of a tumor successfully removed by Bremer and Carson¹³ which invaded the base of the second frontal convolution.

DISCUSSION.

DR. WARREN: I think this contribution is valuable just at this time when so much interest is taken in cerebral surgery, and undoubtedly the more attention we give to such cases the more cases surgeons will see which are capable of being helped by surgical interference.

I saw a case the other day, somewhat similar in its pathological conditions to that reported. I was sent for to go to the hospital for an accident. A man had been picked up on the railroad track. The nature of the

¹¹ See case by Starr: *Familiar Forms of Nervous Disease*, 1890. p. 73.

¹² Walton: *Case of Cerebral Tumor involving the Facial Centre. Autopsy*. *Boston Medical and Surgical Journal*, May 2, 1887.

¹³ *American Journal of Medical Sciences*, September 1890.

accident was unknown. There was a cut on the centre of the forehead, just above the glabella. The patient was comatose. No information of any kind could be obtained. There was right hemiplegia. It seemed improbable that the hemiplegia was caused by any blow such as he had probably received where the cut was, as this was over the frontal sinuses, and, as it afterwards proved, it was a depressed fracture into the frontal sinuses, and did not communicate with the brain at all. Without knowing Nancrede's views, which Dr. Walton has quoted, I decided to explore the motor region of the left side near the fissure of Rolando, and ordered the house-officer to shave the head for that purpose. While the shaving process was going on, the hemiplegia, which was quite complete before that, began to disappear. The man began to move his hand, wrist and leg. Under these circumstances it did not seem to me advisable to put on the trephine. I said "we will explore the wound in the forehead, and if that throws any light on the condition in the interior of the brain, we will go farther if necessary," but it did not, and consequently nothing more was done. To make the story very short the patient made a good recovery, and went home some three weeks after the injury with the wound in the forehead healed. Dr. Walton saw the patient, and I think he can give you some facts with reference to the return of motion. There was on the second day a slight attack of Jacksonian epilepsy, and I think some slight indications of another the day following, and I asked Dr. Walton if he would watch the case, and I added that I was prepared to interfere at any moment. But the moment did not arrive, and the clot which was effused was subsequently absorbed. The question which Dr. Walton raised in conversation with me was as to what might be the subsequent results of a clot of that size (sufficient to produce a hemiplegia)

on the future welfare of the patient, and whether or not it was advisable in these light cases to trephine in order to leave the parts in as normal a condition as possible, and to leave no chance for inflammation of the dura, or of a cyst formation, or of other conditions of inflammatory nature which might give rise to persistent headache. I have recently had a case somewhat near the same region on the skull where there was no actual depression of the bone, but an indentation of the outer table only, and where adhesions of the dura to the skull occurred, and some inflammation of the dura, and trephining was necessary, for the relief of persistent headache, four years after the injury, although at the time there were no motor symptoms. It was supposed to be merely a scalp wound. How far then we are justified in operating for the sake of avoiding future pathological conditions is a question which is to be studied out carefully.

In regard to the technique of operations for trephining, etc., I would say that I found in some of my cases difficulty in getting the scalp wound healed entirely, particularly when the drain has been left in. If the patient is allowed to go about and the dressing is taken off, there is danger of relapse. One is uncertain as to what may happen to the patient, if the wound is left unhealed. There is, therefore, now a tendency to sew up the wound entirely without any drain, and thus secure union by first intention. I have recently done this with satisfactory results, in a case a few weeks ago, and healing took place at once.

DR. RICHARDSON: Before the discussion goes any farther, and before the neurologists discuss this paper, I would like to ask their attention to that part of the subject, which pertains to the indications for trephining, that is, as to where the line is to be drawn which would separate a case where trephining certainly ought to be done from one where it ought not to be

done. A case came under my observation very similar, in its history and symptoms, to that presented this evening, but not, however, so definite a case for interference. It was carefully watched for a long time, and no operation was performed. Not having the records of the case with me, I cannot give the details. I think Dr. Walton saw the case, and I know that Dr. Putnam did, I have felt ever since that I may not have given this man the best chance for recovery. He recovered, however; but I have not heard from him since he left the hospital.

DR. KNAPP: As to the point which Dr. Richardson has brought up, I intended to speak before he suggested it. I think that every one will admit that in cases of meningeal hæmorrhage we should trephine, and remove the clot. There are two questions, however, that come up. The first is one which Dr. Warren has broached, namely, where the symptoms are slight and there is probably only a very slight hæmorrhage, should we trephine? I would say, in answer to that, very briefly, that my feeling would be to trephine, but I will return to that point later. The second point is in regard to the diagnosis of meningeal hæmorrhage. Of course, there are a good many cases where we feel reasonably sure, but there are other cases where there is no history, where a man is picked up unconscious, and we find him paralyzed.

Here the question must arise. Is there a meningeal hæmorrhage due to some injury, or is there an intracerebral hæmorrhage or thrombosis or embolism which has come on perhaps secondarily to some slight injury, or perhaps spontaneously, and any injury, if injury there be, is secondary to the hæmorrhage? That is, the man, having an apoplectic stroke, falls unconscious and perhaps cuts his head as he falls. In such cases we get some little help by the presence of Jacksonian epilepsy, by the unequal pupils, by the slowly progres-

sive character of the paralysis or of the coma, but none of those are absolutely decisive. In such cases I believe if there is a fair suspicion of a meningeal hæmorrhage or of an injury, it is well to trephine for the purpose of diagnosis, the operation itself not being particularly serious, not adding very greatly to the danger, while the chance that the hæmorrhage is meningeal, and the possibility of removing the clot, certainly justifies the risk. If the hæmorrhage be intracerebral then, of course, nothing can be done, and it has taken something from the patient's chance of recovery. If the hæmorrhage be meningeal it gives him an excellent chance of recovery. So much for the question of operating in meningeal hæmorrhage. To return to the point which I previously referred to, of operating in slight cases, that would come under the consideration of operating in cases of fracture. In the discussion of a paper which Dr. Porter read last year, several of the neurologists present, myself among them, advocated trephining in certain cases of fracture, because we saw more than the surgeons did the bad results from fractures, the epilepsies, the dementias, the persistent headaches that come on after old fractures. Furthermore, the case Dr. Warren reported in the *Journal of Medical Sciences* last spring or winter shows the advantage, in fractures of the base, of trephining for drainage; but the opinions hinted at then have been more than confirmed by Mr. Horsley this summer, when he said that every case of fracture of the skull should be trephined. Therefore, to avoid the risks of a small clot retained in the cranial cavity, I think we should trephine in cases of mild hæmorrhage.

In regard to what Dr. Walton has said concerning Jacksonian epilepsy, although it is most distinctly a valuable symptom, I think we should be cautious of making too definite a diagnosis from that symptom alone. The investigations of Sepilli and Löwenfeld

and the recent paper of Oppenheim on brain tumors show very conclusively that Jacksonian epilepsy is not by any means an absolute localizing symptom.

Dr. Walton has referred briefly in the beginning of his paper to the question of operating for tumors. I would agree with him upon his estimate of the percentages, and upon the very limited field for such operations. There are, however, two points that I should like to bring forward. The first is his suggestion that gummata are hardly to be operated upon, and with that I am disposed to disagree because I do not believe you can get a gumma absorbed by any amount of mercury or iodide without leaving a good deal of connective tissue there which will act in the same way as the gumma. The opinion of a number of neurologists and of Mr. Horsley is that the gumma should be removed like any other tumor.

The second point which Mr. Horsley urged this summer, I spoke of at the meeting of the Observation Society, last October. In the cases of brain tumor where the local diagnosis is not possible, or where the tumor is probably a malignant growth or so thoroughly infiltrated that it cannot be removed, or where the local diagnosis is possible, and it is in a situation that renders it impossible to be removed, and where there is intense and persistent headache, there Mr. Horsley says, and he substantiates it by successful results in four cases, that the patient should be trephined to relieve the headache.

DR. BULLARD: As to the question asked by Dr. Richardson, it seems to me that we can draw a more or less definite line in regard to those cases of middle meningeal hæmorrhage which should be trephined in this way. Trephining is no longer so serious an operation as it was at one time, and it may be considered in many cases only a moderately serious, or perhaps you may say slightly serious, operation. For

this reason it seems to me, that, in any case where the diagnosis of hæmorrhage of the middle meningeal has been made and the symptoms are serious in character, threatening the life of the patient, and where there is nothing to absolutely contraindicate an operation that trephining should be done. It seems to me that in all other cases of moderate severity, but not threatening the patient's life, which remain persistent for a considerable length of time, such as persistent hemiplegia, operation should be done. On the other hand, where the symptoms are slight, and where there is reason to suppose they may shortly disappear, it seems to me we should wait a reasonable length of time. I am not inclined to agree with those who believe that every fracture of the skull should be trephined at once. It seems to me that there are many cases in which it is advisable to wait.

In regard to the localization in these cases, it is sometimes a simple matter; but, on the other hand, it is not infrequently very difficult to determine even on which side of the brain we should trephine. It is probable that in a very large number of cases where there is a fracture (and this fracture may not be always in the outer table or apparent), there is more or less contusion of the brain on the other side. A large number of autopsies have lately been published in which contusion was found in nearly every case in the opposite temporo-sphenoidal lobe. I saw a case a short time ago in which there was considerable difficulty in the localization. The patient was injured one evening, struck on the head with some hard substance, and after the blow was able to walk some distance, get his head dressed and go home. The next morning he was found unconscious and brought to the hospital. I saw him the fourth day after the accident. He had been entirely unconscious from the moment of entrance to the hospital. There was no marked paralysis anywhere, slight nys-

tagmus was the only other symptom. There was a small incised wound on the right parietal bone, but no evidence of fracture could be found. It was thought by the gentlemen in charge, and those who had an opportunity of watching him that the limbs on the right side were a little weaker than those on the left, but nevertheless there was movement in the extremities on both sides. The question was where to trephine. After examining the case thoroughly it was decided that trephining was advisable, inasmuch as the patient was in a somewhat dangerous condition, and it was decided that the slight paralysis on the right side must be neglected. The operation was performed over the place of the incised wound. There was no fracture of the outer table of the skull, but there was fracture of the inner table, and the clot was found underneath and removed. I give this simply as an illustration of some of the difficulties in localization.

There is one surgical question that I should like to speak of and inquire about. What measures should be taken to prevent secondary hæmorrhage? In one case in which I had the opportunity of seeing the autopsy, the death was unquestionably by secondary hæmorrhage. The clot was removed and the artery within twenty-four hours began to bleed again. The fracture was at the base of the brain.

DR. RICHARDSON: I am very glad to hear the opinions expressed by Dr. Knapp and Dr. Bullard. I must say that I don't agree with Dr. Knapp in the only part of the subject with which I feel familiar, and that is the question of trephining. I agree that the lifting of a fragment from the dura mater is not a dangerous operation. I think, however, that when the dura mater is opened and the brain is exposed, it then becomes dangerous, and I do not think we are justified at present in doing a dangerous operation for a slight hæmorrhage. I agree with Dr. Bullard in that respect.

Dr. Bullard has mentioned one case of trephining, which resulted fatally. I think every case in which I have opened the dura mater has been fatal, and with such an experience I feel as if there was considerable danger in operations where the brain is exposed. I dare say it was my fault, but I am one surgeon, and that is my experience, and the collective experience of all surgeons will be the average; and we have to consider the average amount of skill and average amount of success, and therefore at present it seems to me that for slight symptoms and slight hæmorrhage we cannot feel justified as yet in opening the dura mater. In the case I referred to in which there were decided symptoms of pressure, in which also, as I remember it, the neurologists were doubtful as to the exact localization, I felt that the safe course was to let the matter rest. I dare say I was wrong about it, but there certainly must be a line somewhere; there must be hæmorrhages so slight that they can be disregarded, and on the other hand we ought not to refrain from operating in other cases where the symptoms are somewhat severe. I dare say the neurologists see more cases of cerebral irritation from depression than the surgeons do, and yet when we remember how many cases come to the surgeon and how few are referred back by the neurologists for operations for secondary symptoms, the number is very small; and yet the more I see of surgery the more I am coming to that opinion that depressed fragments upon the dura mater ought to be lifted.

DR. KNAPP: I did not mean to say that every fracture of the skull is going later to develop epilepsy or persistent headache or dementia, but a certain number of these cases do; which cases will and which will not we are not yet in a position to say, and until we are able to decide, I think we should be on the safe side, and save patients from the fate of epilepsy.

As regards opening the dura I can speak simply from my own experience this last spring. I had two cases which were operated on by Dr. Post. One case was a girl with a depressed fracture in the forehead, close to the longitudinal sinus, and six or seven years later she developed epilepsy. If she had been trephined when first injured, when she lay in the hospital in Ireland, I believe she never would have had epilepsy. She was trephined. The scar was close to the longitudinal sinus and thickened membrane was found. A part of the thickened dura was removed, cut as close to the sinus as possible without going into it, and a little brain substance was removed and that patient two days after the operation was sitting up in bed reading; and in six days she was walking about the ward.

The second case I reported last June to the Neurological Association. It was that of a man who had a slowly developing dementia, and symptoms of general paralysis after injury to the head. After trephining and removal of a small portion of the dura and of the brain substance that man did, uninterrupted, well. He stayed in bed about three weeks, not necessarily, but by a mistake, my orders being misunderstood. These cases show that opening the dura is not always fatal. Of course my personal familiarity with operation on the brain is rather slight. I do not see what particular additional risk you get by opening the dura provided you are doing an aseptic operation.

DR. BRADFORD: I think we would all agree with Dr. Richardson that the opening of the dura means greater danger than not opening the dura, but does he not exaggerate the danger of trephining where the dura is not opened? I understand Mr. Horsley's position to be this: that the surgical world to-day is in danger of overlooking cases that could be saved after exploratory trephining. If there is no bulging of the

membrane and no intracranial pressure it can readily be seen that the risk of trephining without opening the dura is not very great. If there is intracranial pressure, the risk of leaving such cases untreated is great. In regard to our not seeing these cases of fracture and the epilepsy that follows, it may, I think, be explained in this way: that these cases wander to other institutions. The classes of cases that come to the hospital are the floating population. A man may have an operation here and go out West and have his epilepsy there. I am inclined to think that a fracture of the skull is more of an injury than we sometimes think.

DR. RICHARDSON: I think I was misunderstood in regard to where the dura is not opened. I have trephined perhaps ten or fifteen times where the button has been raised from the dura without any difficulty at all. I appreciate more and more the dangers of leaving a fracture to itself. In the cases which I reported a number of years ago, which were never published, the discussion at that time was as to whether simple fractures of the skull with depression, without symptoms, should be trephined. I think the opinion was rather against it then. I think we are coming to the opinion that depressed fractures generally should be trephined. I have just removed a depressed piece of bone from the frontal lobe right over the longitudinal sinus. A boy fell and received a compound depressed fracture ten years ago and was just beginning to get his epilepsy.

DR. ELLIOT: A year ago last summer I was with Mr. Horsley for about six weeks and saw him operate a good deal, and in that time he must have trephined ten or fifteen times, and there was not a single case that had a bad symptom. In all the cases he opened the dura without any ceremony at all. He, however, seemed to be more careful than any operator I have seen in handling the brain. He never injured the brain or explored it with trocars. He palpated very

carefully with his fingers, and judged a good deal from what he felt. I think he never considered opening the dura as anything but a necessary part of every operation. I saw some of the cases of trephining for pain and headache, where the tumors were large and located in impossible places. He took out two buttons of two inches diameter on each side. He left the trephine hole full of blood and sewed up, and all healed by first intention. He thinks, and I should think, that it is entirely a question of asepsis, that you could open freely without danger if you really were aseptic. Speaking of the question of secondary hæmorrhage and the methods of controlling it, I had a case last year while substituting for Dr. Homans. It was a fracture of the base and opened into the lateral sinus, and a piece of the bone was pulled out and the lateral sinus bled freely. That was packed with iodoform gauze which controlled the bleeding fully.

DR. PORTER: I have been very much pleased in listening to the opinions which have been expressed to-night, having read a paper on the subject of trephining in cases of comminuted and depressed fractures, and I think as I recollect the discussion of that evening that the discussion to-night is very much in advance, much more in favor of operation in such cases without more definite indications, and I think that is due largely to the greater experience coming to various surgeons from the aid and advice of the neurologists in connection with trephining for the various troubles which I called attention to at that time, and which follow upon the injuries later in life.

In regard to the subject of controlling the hæmorrhage I don't see why hæmorrhage must not be controlled in this region as anywhere else. I reported, in connection with Dr. Marion some years ago a very interesting case where I trephined, and where there was very extensive hæmorrhage indeed on the third

or fourth day, so that when the wound was opened and the clot turned out, and it had to be turned out with a spoon, it was found that the whole anterior portion of the brain had been compressed backwards in a line almost vertical with the external auditory meatus, and the whole surface was oozing everywhere. I had never seen a case of the kind, and I had always been brought up to feel that everything foreign introduced into the cranial cavity under such circumstances was very injurious, and yet I thought then that there was nothing to do but to use compression, and I put in sponges with strings tied round them, numbering them so that I should know how to take them out; and they remained in twenty-four hours; the bleeding still continuing, the sponges were put in again; on their final removal the brain gradually came forward and filled up the cavity, and the man made a good recovery.

DR. BULLARD: In one of the cases which I have seen, the patient was in a dangerous condition entirely due to the compression, and if any other method can be found by which the brain can be relieved of the compression and at the same time the hæmorrhage can be controlled, it would be of the greatest service to the patient. As it was, relief from compression caused a great and rapid improvement in the patient's symptoms.

Dr. Richardson must have misunderstood my meaning if he thought that I intended to imply that the trephining in the case of hæmorrhage had anything to do with the death of the patient. The patient died, but I have been unable to learn whether the operation itself had anything to do with his death.

DR. HOMANS: I would only call attention to the fact that this was a case of trephining for hæmorrhage by contre-coup, and I did not enter into the case of trephining for the relief of fracture. So far as Dr. Walton and I know, this is the only successful case of trephining for contre-coup.

DR. WALTON: The most important point seems to be the practical question introduced by Dr. Richardson, as to just when we are to operate in these cases. It seems to me hardly satisfactory to follow any one absolute rule, such as, for example, in every case of supposed superficial hæmorrhage operate, or in every case of fracture operate. In case of punctured fracture I should always advise operation, as in every case of compound fracture, but in simple fractures I should be guided by the angle of the depression, by its amount, and by the severity of the cerebral symptoms, that is, the sharper the angle of depression, and the more marked the cerebral symptoms, the greater the indication for operation. In the same way regarding hæmorrhage, I think Dr. Warren's case shows the wisdom of deciding each case on its own merits. Here we had probably to do with a superficial hæmorrhage, but with one capable of absorption. The patient had a definite paralysis of the right arm. I remember tickling the cilia of the right eye when he was in a state of partial unconsciousness, and he would raise the left hand immediately to it, but would not move his right, which would have been a more convenient one. His grasp was weak and the right arm definitely paralyzed. I watched him twice a day regularly, ready to advise operation in case it seemed advisable. I said to Dr. Warren when I first saw him: that in case he became comatose, or in case convulsions came on of any severity, or in case the patient in any way should become definitely worse instead of better, I should operate; but instead of getting worse he continually grew better, and finally was discharged, I think, well. Now I think that illustrates the point. Of course, if we are sure that a hæmorrhage is now going on when we examine a patient with reference to operation, we certainly ought to operate and stop the hæmorrhage, but if we find the patient on the whole

steadily improving, then it becomes an open question, and without any definite rule as to whether to operate or not. Here I think we have to decide in every individual case whether, on the whole, the final results of the compression, paralysis, for example, or the liability to future convulsions, will be severe enough to justify our doing an operation which really is dangerous. There can be no doubt that it is dangerous, although opinions differ as to how dangerous it is. We must decide in our own case: would we care to undergo that operation and have a hole left in our skull, if we did not put the button back, which is always a source of some danger, although not great, and undergo the dangers of an operation for hæmorrhage, which we are not quite sure is on the cortex, or which may be absorbed spontaneously?

With regard to the question of drainage which Dr. Warren has brought up, I only view these cases as a neurologist, and not as an operator, and have hardly a right to opinion on that subject, but it seems to me the cases that had free drainage have got on better. The case that Dr. Richardson alluded to that he had last Saturday, although the dura was not opened, a fair-sized drainage-tube was put in, and I understand from Dr. Scudder that the temperature has not arisen since the day of operation above 98.6° . It is an exceptionally good recovery. When Dr. Keene wrote his article in 1888 for Wood's "Handbook of Therapeutics," he cited all the cases he could find in which drainage had been used and those in which it had not been used, or there was no record of it being used, and he found the proportion of recovery was much greater in those in which drainage had been used. Whether he has changed his views, I do not know.

There has been one other successful case of operation for hæmorrhage by contre-coup, reported by Watson in the *Lancet*.

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